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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/536,462	12/05/2005	Mirko Lehmann	1001/0167PUS1	4952

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EXAMINER	
ENIN-OKUT, EDU E	
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1727	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/536,462	LEHMANN, MIRKO	
	Examiner	Art Unit	
	Edu E. Enin-Okut	1727	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 October 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23,25 and 26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23,25 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

FUEL CELL WITH FUEL SUPPLY DEVICE AND METHOD FOR PRODUCING THE SAME

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 10, 2010 has been entered. Applicant has amended claims 1, 5, 8, 9, 12, 14, 19, 22, 23 and 25 and added claim 26. Claims 1-23 and 26 are pending.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Terminal Disclaimer

3. The terminal disclaimer filed on July 30, 2010 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of US 7,422,816 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Rejections - 35 USC § 112

5. The rejection of claims 12 and 23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement is maintained. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably

convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The rejection is repeated below for convenience.

Regarding claim 12, upon review of the instant specification, there does not appear to support of the limitation recited with respect to positioning a fuel cell sensor in the reservoir.

Regarding claim 23, upon review of the instant specification, there does not appear to be support for the limitation recited with respect to measuring the resistance of the reservoir.

6. Claim 26 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 26, the claim recites "The integrated fuel cell and integrated circuit device of claim 1, where no ... separate fuel reservoirs are provided." However, claim 1 recites "An integrated fuel cell and integrated circuit device, comprising: … a reservoir containing fuel disposed with the first electrode; …". It is unclear how no separate fuel reservoirs can be provided when the parent claim, claim 1, recites that there is a separate "reservoir containing fuel". (Examiner's Note: For purposes of examination, it will be assumed that claim 26 refers to reservoirs other than that recited in claim 1.)

Claim Rejections - 35 USC § 103

10. The rejections of claims 1-23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski et al. (US 2003/0039874), in view of Tanaka (US 2002/0076586), Mukerjee et al. (US 2002/0168560), Uchida et al. (US 6,057,051), and Anderten et al. (US 4,164,172), are withdrawn because claims 1, 5, 8, 9, 12, 14, 19, 22, 23 and 25 were amended.

11. Claims 1-10, 12-22 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chason et al. (US 2003/0015705) in view of Gore (US 6,855,443) and Sanders (US 2004/0101740).

Regarding claims 1, 6 and 7, Chason teaches a composite integrated circuit ("integrated fuel cell and integrated circuit device") that can include an energy component, such as a fuel cell, and an operative component integrated into a single, CMOS integrated circuit (i.e., an electrical semiconductor component) having a silicon substrate ("semiconductor substrate") (para. 96,131). The fuel cell includes fuel, electrode materials, and an electrolyte (para. 131).

Chason does not expressly teach that the fuel cell has first and second electrodes with a catalytic layer positioned between them; or, a reservoir containing fuel disposed with the first electrode; a reservoir containing fuel disposed with the first electrode; or, a reactant delivery device positioned on the side of the second electrode; or, that the fuel is integrated into the material of the first electrode.

As to the fuel cell having first and second electrodes with a catalytic layer positioned between them, it would have been obvious to one of ordinary skill in the art at the time of the invention to include first and second electrode, an anode and a cathode, with a catalytic layer disposed therebetween in the fuel cell employed in the device of Chason because a catalytic layer sandwiched by an anode and a cathode are well-known in the art as part of the basic structure of a fuel cell.

As to a reservoir and a reactant delivery device, Gore teaches an electrochemical cell, with an anode (fuel electrode) and cathode (air electrode), where fuel consumed by the anode is situated adjacent to the anode (1:6-7, 2:14-32, 4:50-54). Air can be supplied to the cathode of the cell by exposure to ambient air, through a vent formed in a housing holding the cell, or by a fan located in the housing (para. 2:21-11, 4:27-41). Thus, it would have been obvious to one of

ordinary skill in the art at the time of the invention to dispose a reservoir containing fuel with the first electrode used in the fuel cell of the device of Chason because, and include a reactant delivery device positioned on the side of the second electrode, because Gore teaches that these are suitable means with which to provide fuel and reactant to the to the anode and cathode of an electrochemical cell. Further, as to positioning the reactant delivery device, it also would have been obvious to that skilled artisan to position the reactant delivery device on the side of the second electrode because it minimizes the distance between the supply and its target which, in turn, minimizes loss by dissipation in transit.

As to the fuel cell being integrated into the material of the first electrode, Sanders teaches a catalyst that can be used at the anode in a fuel cell reaction which can store and release a gaseous element, such as hydrogen (para. 17,44,45,79,80). The reference also teaches that an electrode can also include a hydrogen-absorbing material, such as a metal hydride, interspersed through it with a catalyst coating (para. 25,26). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate fuel into the material of the first electrode employed in the fuel cell of the device of Chason because Sanders teaches that this can facilitate the safe, low-cost, storage of hydrogen which is easily available for later use (see Sanders, Abstract, para. 12,163,164).

Regarding claims 2, product-by-process claims are not limited to the manipulations of the recited steps, only the structure implied by the steps. See MPEP 2113. Therefore, these limitations have not been given patentable weight. However, one of ordinary skill in the art would appreciate that the catalyst (or electrode) of Sanders, that can store a gaseous element (e.g., hydrogen) upon exposure to a gaseous, pressurizable environment (see Sanders, para. 28,29), is “a contacted material treated with fuel” as recited in the claim.

Regarding claim 3, Sanders also teaches that the catalyst may include a coating of palladium (para. 19).

Regarding claim 4, as discussed above, Gore teaches that fuel, such as a borohydride, is consumed by the anode is situated adjacent to the anode (see also Gore, para. 2:34-39). Chason and Gore do not expressly teach that the fuel is hydrogen. However, also discussed above, Sanders teaches materials useful in fuel cells that can reversibly store and release gaseous elements, such as hydrogen. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to store hydrogen in the reservoir used in the device of Chason, as modified by Gore and Sanders, because Sanders teaches that this can facilitate the safe, low-cost, storage of hydrogen which is easily available for later use; and, the skilled artisan would appreciate the hydrogen can be directly used by the electrode of the fuel cell without precursor reactions.

Regarding claim 5, Chason does not expressly teach that the reactant delivery device includes a space surrounding at least the second electrode or space surround the reaction region. However, Gore teaches that air can be supplied to the cathode of an electrochemical cell by exposure to ambient air, through a vent formed in a housing holding the cell, or by a fan located in the housing (para. 2:21-11, 4:27-41), as discussed above. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention place the device of Chason, as modified by Gore and Sanders, in a housing where the reactant delivery device includes either a space surrounding its second electrode or space surrounding the reaction because Gore teaches both serve as suitable means with which to provide a reactant to an electrochemical cell.

Regarding claims 8 and 9, Chason teaches that the composite integrated circuit can include processing circuitry ("control device") (e.g., electronic circuitry such as a microprocessor, RAM, etc.) (para. 136),

As to the remaining this limitations recited in these claims, they have been considered, and construed as the manner of operating an apparatus that adds no additional structure to the integrated fuel cell and integrated circuit device as claimed. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham,* 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP 2114.

However, Sanders does teach that different techniques can be used to control the accumulation or liberation of stored gaseous elements, such as temperature, pressure electrical potential and current flow (para. 123). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the control device of Chason, as modified by Gore and Sanders, to control at least one of current flow or an energy feed; and activate an electrochemical reaction between its electrodes or complete an electrical circuit through the electrodes, because Sanders teaches that it is a means with which to control the accumulation or liberation of stored gaseous elements.

Regarding claim 10, Chason, Gore and Sanders do not expressly teach that the control device includes a closure device. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to include a closure device, such as a louver that open an closes a vent, a part of the control device employed in the device of Chason, as modified by Gore and Sanders, because use of a louver to open, or close, a vent is well-known in the art as a means with which to control the flow of air through the vent. As to the remaining limitations

recited in these claims, it has been held that a recitation with respect to the manner in which a claimed apparatus is to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987).

Regarding claim 12, Chason does not expressly teach a fuel sensor positioned in at least one of the reservoir or the reaction region, to determine the amount of fuel. However, Gore teaches a fuel level indicator can be incorporated into the electrochemical cell (5:1-6, 6:13-16, 6:22-26). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to include a fuel sensor in fuel cell used in the device of Chason because Gore teaches it is a means with which to measure the concentration or level of fuel in the cell (see Gore, 5:1-6). Further, as to positioning the sensor in reservoir or the reaction region, it would have been obvious to one having ordinary skill in the art at the time the invention was made to dispose the fuel sensor in the reservoir or a reaction region of the fuel cell used in the device of Chason, as modified by Gore and Sanders, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950). See MPEP 2144.04 (VI).

Regarding claim 13, the limitations recited in this claim have been addressed above with respect to claims 1 and 2.

Regarding claim 14, Chason does not expressly teach that reactant is integrated into the material of the second electrode. However, Sanders also teaches a catalyst can store and release oxygen (para. 17,18). Thus, it would have been obvious to include a reactant integrated into the material of the second electrode of the fuel cell employed in the device of Chason, as modified by Gore and Sanders, because Sanders teaches this can eliminate the need for expensive storage and handling equipment (see Sanders, Abstract).

As to the limitation "only reactant from the reactant delivery device can react with the fuel" recited in the claim, this limitation has been considered, and construed as the manner of operating an apparatus that adds no additional structure to the integrated fuel cell and integrated circuit device as claimed. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham,* 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP 2114.

The remaining limitations recited in this claim have been addressed above with respect to claim 1.

Regarding claims 15 and 16, product-by-process claims are not limited to the manipulations of the recited steps, only the structure implied by the steps. See MPEP 2113. Therefore, these limitations have not been given patentable weight.

However, Sanders teaches materials useful in fuel cells that can reversibly store and release gaseous elements, such as oxygen (Sanders, para. 28,29). The skilled artisan would appreciate that the material of Sanders, that can store a gaseous element (e.g., oxygen) upon exposure to a gaseous, pressurizable environment (see Sanders, para. 28,29), is "a contacted material treated with reactant" as recited in the claim. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to include a contacted material in the reactant delivery device used in the device of Chason, as modified by Gore and Sanders, because the skilled artisan would appreciate that the material can provide an additional, or alternative, means of storing and supplying a reactant, such as oxygen, to an electrochemical cell.

Regarding claims 17, 18, 19, 20 and 21, the limitations recited in these claims have been addressed above with respect to claims 7, 8, 9, 10 and 11.

Regarding claim 22, Chason does not expressly teach a reactant sensor positioned in at least one of the reactant delivery device or the reaction region, to determine the amount of reactant. However, Gore teaches a fuel level indicator can be incorporated into the electrochemical cell (5:1-6, 6:13-16, 6:22-26). Although Gore does not expressly teach a *reactant* sensor [emphasis added], it would have been obvious to one of ordinary skill in the art at the time of the invention to include a reactant sensor in fuel cell used in the device of Chason because Gore teaches that a sensor is an effective means with which to measure the concentration or level of the material available to be supplied to a fuel cell (see Gore, 5:1-6). Further, as to positioning the sensor in reservoir or the reaction region, it would have been obvious to one having ordinary skill in the art at the time the invention was made to dispose the fuel sensor in the reservoir or a reaction region of the fuel cell used in the device of Chason, as modified by Gore and Sanders, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950). See MPEP 2144.04 (VI).

Regarding claim 26, the integrated fuel cell and integrated circuit device of Chason, as modified by Gore and Sanders, teaches that no additional fuel supply channels or separate fuel reservoirs, other than the reservoir containing fuel disposed with the first electrode, are provided.

12. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chason et al. (US 2003/0015705), Gore (US 6,855,443) and Sanders (US 2004/0101740) as applied to

claims as applied to claims 1-10, 12, 13, and 26 above, and further in view of Mukerjee et al. (US 2002/0168560).

Chason, Gore and Sanders are applied and incorporated herein for the reasons above.

Regarding claim 11, Chason, Gore and Sanders do not expressly teach that the fuel cell is configured as a replaceable module.

Mukerjee teaches that a modular configuration of fuel cells permits the arrangement of the cells to be easily adjusted to meet specific physical design criteria, such as, for example, a particular packaging arrangement (para. 49). In addition, the modules can be serviced or replaced individually, and making maintenance easier by avoiding the disassembly of a fuel cell assembly (para. 49).

It would have been obvious to one of ordinary skill in the art at the time of the invention to make the fuel cell used in the device of Chason, as modified by Gore and Sanders, a replaceable module because Mukerjee teaches that its eases the process of adjusting the arrangement of cells to the accommodate the size of the unit they are to be used, and improves the ease of cell maintenance.

13. Claims 23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chason et al. (US 2003/0015705), Gore (US 6,855,443) and Sanders (US 2004/0101740) as applied to claims 1-10, 12-22 and 26 above, and further in view of Anderten et al. (US 4,164,172).

Chason, Gore and Sanders are applied and incorporated herein for the reasons above.

Regarding claim 23, Chason, Gore and Sanders do not expressly teach a circuit for at least one of measuring the resistance of the reservoir and of the reactant delivery device, and for determining the remaining amount of one of fuel and reactant.

Anderten teaches a fuel cell 36 connected to an oxygen control circuit 34, which employs a FET (field effect transistor) to measure the resistance in the circuit, that controls the amount of oxygen made available to the cell dependent upon the magnitude of the current produced by the cell (Abstract; 4:16-33, 4:45-58, 4:59-5:3, 5:21-36; Fig. 3). One of ordinary skill in the art would appreciate that the methods described by Anderten can also be applied to the fuel (e.g., H_2, etc.) supplied to a fuel cell.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a circuit to measure the resistance of the reservoir or the reactant delivery device used in the fuel cell used in the device of Chason, as modified by Gore and Sanders, because Anderten teaches that it provides a means with which to control the amount of fuel or reactant made available to its fuel cell.

Regarding claim 25, Chason, Gore and Sanders do not expressly teach a measuring device configured to determine at least one of a current and a voltage generated by reaction between the fuel and the reactant. However, Anderten also teaches that the oxygen control circuit 36 discussed above responds to predetermined maximum and minimum voltage levels corresponding to maximum and minimum oxygen partial pressures of the air made available to the fuel cell 36 (4:59-3, 5:49-6:43). Also, as discussed above, one of ordinary skill in the art would appreciate that above-described method of Anderten can also be applied to the fuel (e.g., H_2, etc.) supplied to the cell.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include a measuring device in the fuel cell of Chason, as modified by Gore and Sanders, because Anderten teaches that it provides a means with which to control the amount of fuel and reactant made available to the cell.

Double Patenting

14. The rejection of claims 1-3 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 4, 6, 11, 12 and 14-16 of U.S. Patent No. 7,422,816 is withdrawn because the terminal disclaimer, filed on July 30, 2010, was accepted, as noted above.

Response to Arguments

15. As to the applicant's arguments filed on October 10, 2010 with respect to the 35 U.S.C. 112, first paragraph, rejection of claims 12 and 23 on p. 12 of its remarks, it is noted that neither Fig. 1 or 2 shows the sensor 18 being disposed *in* the reservoir as recited in claim 12. Further, applicant cites a statement made in the specification with respect to fuel cells being used as "energy reservoirs". However, use as a "energy reservoir" does not describe, or illuminate upon, the structure of the fuel cell as recited in the specification and claims originally filed. With respect to claim 23, the specification states that "... a circuit measures the resistance of the *fuel delivery device*" [emphasis added] on p. 27 of the "clean" version of the specification filed on December 5, 2008.

16. As to the remainder of applicant's arguments, they have been considered, but applicant has amended the claims such that new grounds of rejection were necessitated.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Edu E. Enin-Okut** whose telephone number is **571-270-3075**. The examiner can normally be reached on Monday to Thursday, 7 a.m. - 3 p.m. (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edu E. Enin-Okut/
Examiner, Art Unit 1727

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1727